

# European Electricity Market Summary

Q1-2023

January to March

## Generation and Contribution by Fuel Type

Renewables: 336.7TWh (13%)

Fossil Fuels: 224.8TWh (-13%)

Nuclear: 172.4TWh (9%)

Percentage changes are from the previous quarter

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## 1 Quarterly Review of European Electricity Market Q1 2023

Prices in the wholesale markets for electricity reflect the cost of gas-fired generation and the previous year saw concerns about the lasting impact of the conflict in Ukraine and power scarcity on the winter quarters of Q4 2022 and Q1 2023 as a consequence of reduced gas supply and higher prices. However, there has been a reduction in gas prices throughout the last quarter, due to the significant levels of gas storage remaining in Q4 2022. Thanks to fuel-switching, lower demand and milder temperatures, gas consumption was notably lower compared to previous years. Furthermore, gas prices continued to fall in Q1 2023, as the mild weather persisted.

This quarter's average wholesale gas prices were 29% lower than last quarter's and 45% lower than those seen in Q1 2022. Due to a combination of factors, including unseasonably warm weather, high levels of European gas storage and large volumes of LNG imports, the European and GB market's wholesale electricity prices fell during the quarter.

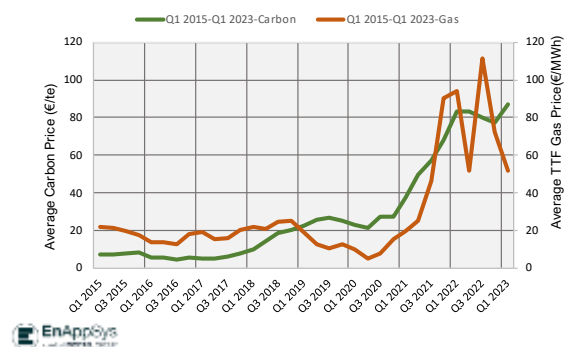


Figure 1: Gas (TTF) and carbon prices from Q1 2015 to Q1 2023

These reductions fed through into wholesale electricity prices with a quarter on quarter falls of about 15% in Spain, 25% in GB, 35% in Italy, 38% in Netherlands, 39% in France, 41% in Germany, and 42% in Denmark. Compared to Q1 2022, Spain saw the highest change of 58% while Denmark recorded the lowest change, of 32%.

The gradual return of French nuclear generation has resulted in France once again becoming a net-exporter of power to its neighbouring countries, following a prolonged period of imports.

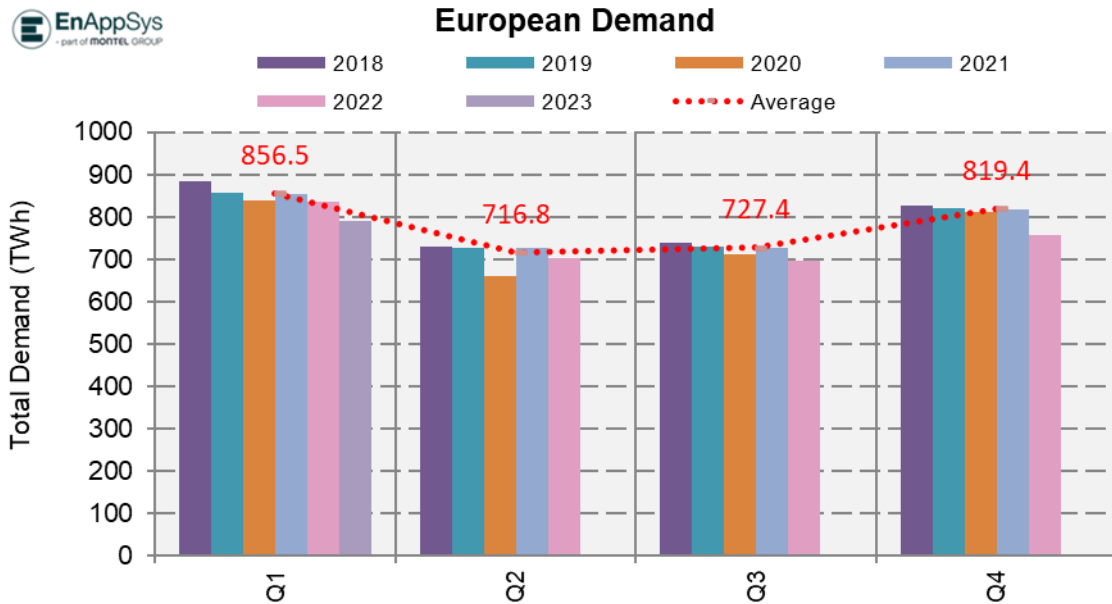
The key takeaways from this quarter are:

- **Lower demand profile / Mild weather and low conventional generation:** Electricity demand was lower than normal for the winter months because temperatures were generally higher this quarter than in recent Q1s and prices higher. This led to the lowest conventional generation (including gas- and coal-fired generation) of any quarter in recent years, paired with significant levels of wind generation. Demand this quarter in total was ~790TWh which is 5% lower than Q1 2022.
- **Gas storage and prices:** Gas storage levels were high this quarter in Europe as the untypically warm weather kept conventional generation lower than levels seen in past Q1s. Prices

for the benchmark TTF trading hub gas decreased throughout the quarter, falling from €74/MWh at the start of January to €47.30/MWh by the end of March.

- **Electricity prices:** Power prices varied between countries considerably, averaging between €130 and €160/MWh, for core countries of Germany, France, Great Britain, Italy, and the Netherlands. At the end of this quarter, prices in France, Italy, Germany, and the Netherlands had changed by over 35% from the levels at the beginning of the quarter, reaching levels of €117/MWh, €139/MWh, €114/MWh, and €112/MWh, respectively, down from levels of €228/MWh, €220/MWh, €188/MWh, and €201/MWh at the beginning of the quarter. GB, however, experienced the smallest change of 17%, with the opening price for the quarter gradually falling from €159/MWh to €131/MWh through the quarter. Fig. 2 illustrates the minimum, maximum and average power prices in the different countries in review.
- **French nuclear return to service:** During 2022, French nuclear output had been severely reduced, as a consequence of the stress-corrosion cracking identified in a number of units and also the impact of a drought during the summer months which had limited cooling water available to the fleet. Under a programme of remedial work being carried out, the French system's nuclear availability was expected to reach 50GW by the middle of Q1. However, due to a number of reasons such as the need for additional repairs and strikes at EDF that led to widespread employee walkouts from nuclear power plants, the schedule ended up being repeatedly pushed back. Early in February, nuclear generation reached its highest level for the quarter of 45GW, but it then dropped to below 38GW for the majority of March.
- **Interconnector flows:** France resumed its position as a net exporter during Q1 2023 after having been a net importer of power during Q2, Q3, and Q4 of 2022 as a consequence of the limited availability of units in the nuclear fleet.. However, because France has continued to be a net importer of power from Belgium, Germany, and Spain, net power exports from France were lower than seen in the quarters preceding Q2 2022.

## Demand reduction



*Figure 3: European electricity demand by quarter for 2020-2023*

The last few quarters in Europe have seen lower demand as a result of higher prices when compared to the corresponding periods in previous years prior to 2022. This trend continued into Q1 2023, with total European demand standing at approximately 790TWh, reflecting a decline of around 5% from Q1 2022. There are two key factors contributing to this downturn: milder weather conditions and the impact of elevated wholesale prices on consumer demand. The reduction in demand was widespread across Europe, impacting both consumers and industry. This trend became especially noticeable during Q4 2022 when demand fell significantly below levels seen in prior years, and it has continued to be evident in Q1 2023..

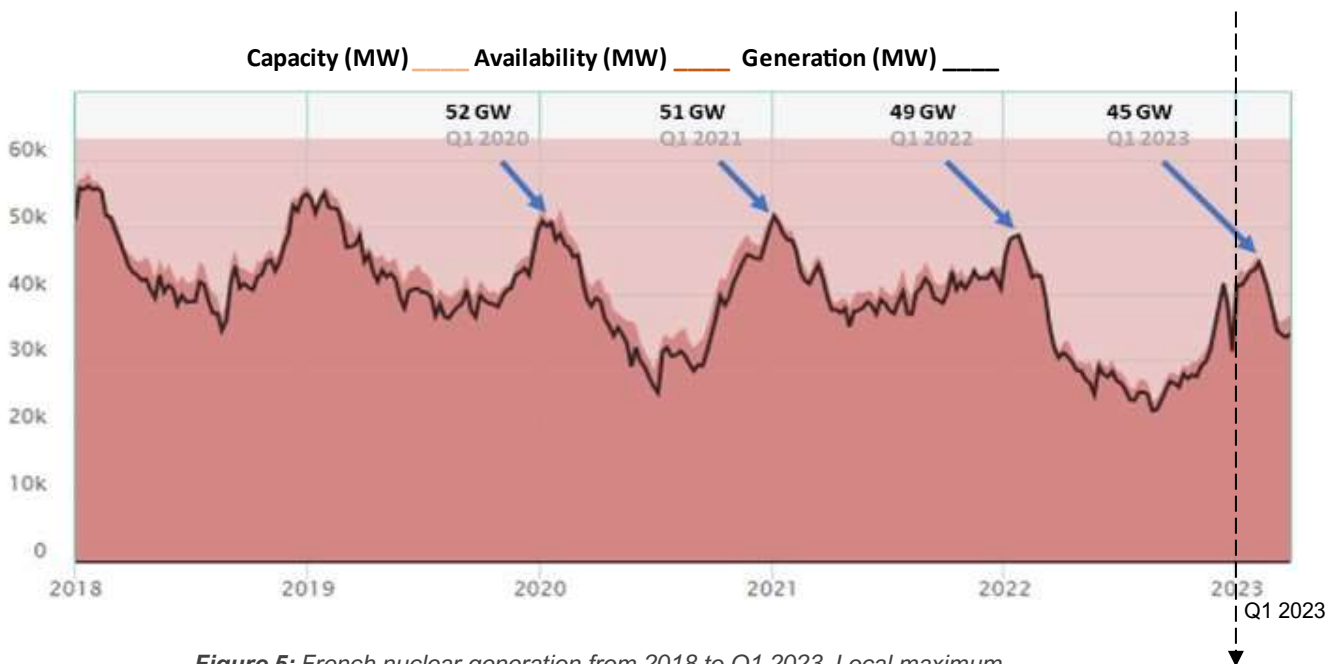
### Gas storage and prices



**Figure 4:** TTF gas prices Q1 2021 to Q1 2023 (EUR/MWh)

Throughout the quarter, TTF gas prices experienced a noticeable decrease, dropping from €74.00/MWh at the start of January to €47.30/MWh by the end of March. The arithmetic average for TTF gas prices stood at around €53.80/MWh for the quarter. The decline in prices during this period can be attributed to the persistently high levels of gas storage, coupled with lower than usual withdrawals from storage amid milder than average weather conditions across Europe.

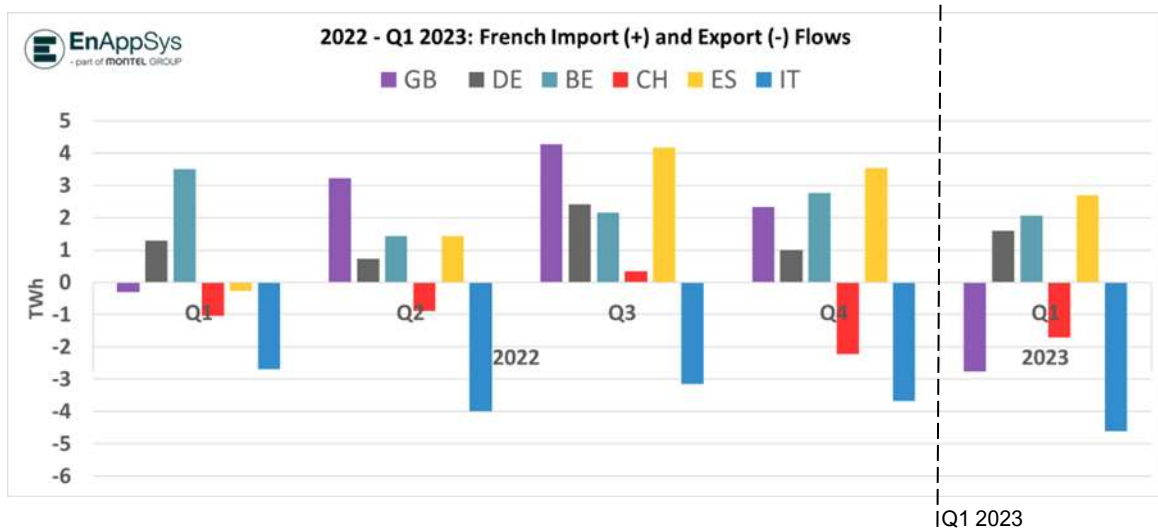
### French nuclear outages and interconnector activity



**Figure 5:** French nuclear generation from 2018 to Q1 2023. Local maximum generation (by quarter range) highlighted.

The average EPEX day-ahead price in France this quarter was €130.4/MWh which was higher than all European countries except for Italy (see Table 1: EPEX Day-ahead quarterly average prices). However, France was a net exporter during Q1 2023 after having been a net importer of power during Q2 and Q3 of 2022. Driven by higher levels of nuclear availability in France as units returned to service, there were more hourly periods during the quarter in which the day-ahead prices in France were lower than those prevailing in GB and CH, and hence more power flow in the direction of GB and CH.

However, because France continued to be an importer of power from Belgium, Germany, and Spain, net power exports from France were lower than seen in the quarters preceding Q2 2022.



**Figure 6:** French interconnector flows across neighbouring countries from 2022 to Q3 2023. High levels of exports can be seen particularly to Italy and GB.

## 2 Day-ahead Price Trends

Table 1 below shows key statistics on pricing in the quarter and all previous quarters over the last seven years. The EPEX Day-ahead prices shown are averages across the quarter.

*Table 1: EPEX Day-ahead quarterly average prices (EUR/MWh)*

	BE	DE	DK (Ave)	ES	FR	GB	IT (Ave)	NL	NO 1-2-5	NO 3-4	SE 3-4	SE 1-2
<b>Q1 2016</b>	28.4	25.2	22.9	30.7	28.8	45.0	39.3	27.7	22.7	22.9	24.3	23.1
<b>Q2 2016</b>	27.1	24.8	25.7	29.5	25.9	44.5	36.3	28.4	22.8	24.1	26.5	26.4
<b>Q3 2016</b>	32.6	28.3	28.9	41.7	32.3	46.5	42.1	31.4	22.4	27.3	29.6	29.5
<b>Q4 2016</b>	58.1	37.6	34.6	56.5	59.8	60.3	53.1	41.4	33.7	33.1	37.0	36.7
<b>Q1 2017</b>	51.7	41.3	31.0	55.6	55.0	55.7	55.3	42.8	31.0	28.7	32.3	31.7
<b>Q2 2017</b>	35.7	29.8	28.7	47.0	33.9	46.6	46.4	34.6	27.1	26.2	28.8	28.5
<b>Q3 2017</b>	34.2	32.7	33.8	48.4	34.5	48.0	52.1	35.4	27.6	25.6	33.7	33.0
<b>Q4 2017</b>	56.8	33.0	30.6	58.0	56.5	56.6	61.0	44.5	29.9	30.0	32.0	30.2
<b>Q1 2018</b>	44.9	35.5	36.8	48.1	43.8	59.7	54.2	45.1	37.8	38.3	39.2	38.9
<b>Q2 2018</b>	44.1	36.0	39.7	52.0	36.8	60.1	55.0	46.1	38.7	39.7	39.5	38.5
<b>Q3 2018</b>	60.7	53.5	53.2	65.8	57.2	68.6	70.3	58.1	49.7	50.2	52.6	51.8
<b>Q4 2018</b>	71.1	52.7	50.4	63.0	62.7	71.0	68.3	60.6	46.8	47.1	50.2	47.4
<b>Q1 2019</b>	48.6	41.4	43.0	55.0	47.2	59.3	59.3	48.6	48.0	46.1	46.7	46.0
<b>Q2 2019</b>	34.5	36.6	36.9	48.7	34.9	47.2	52.3	39.1	37.0	35.3	33.8	33.0
<b>Q3 2019</b>	35.0	36.9	38.0	46.2	35.5	42.7	52.9	37.9	33.2	34.7	36.6	35.3
<b>Q4 2019</b>	39.4	36.7	38.9	41.0	40.3	46.7	48.5	39.3	39.0	37.7	39.4	37.5
<b>Q1 2020</b>	30.1	26.1	21.2	34.9	29.4	38.0	40.4	30.5	15.1	15.4	19.5	15.6
<b>Q2 2020</b>	18.5	20.5	20.5	23.2	18.0	27.3	25.2	20.9	4.5	5.6	16.2	8.2
<b>Q3 2020</b>	36.5	36.0	33.9	37.5	39.0	40.2	43.9	35.3	4.8	5.7	29.1	18.6
<b>Q4 2020</b>	42.3	38.6	31.0	40.1	42.2	52.6	49.5	42.1	12.6	10.0	29.2	15.1
<b>Q1 2021</b>	51.0	49.8	49.1	45.2	53.0	63.6	58.8	50.6	46.8	35.5	47.6	37.5
<b>Q2 2021</b>	62.3	60.9	58.7	71.8	63.9	72.2	77.2	62.1	47.2	30.0	46.5	33.1
<b>Q3 2021</b>	97.3	97.3	96.0	117.8	96.6	128.6	126.2	101.5	77.8	45.1	80.8	54.8
<b>Q4 2021</b>	204.3	183.5	147.1	211.0	221.4	205.3	237.4	196.0	126.4	41.5	117.3	44.5
<b>Q1 2022</b>	208.0	185.4	152.6	229.4	232.2	200.8	246.0	207.5	151.4	20.1	105.6	24.8
<b>Q2 2022</b>	193.9	188.5	179.6	182.8	226.0	155.3	247.0	195.5	167.1	18.6	119.4	51.7
<b>Q3 2022</b>	372.3	380.8	347.9	146.3	429.7	294.8	461.6	365.4	309.7	22.4	188.8	49.0
<b>Q4 2022</b>	202.6	194.6	176.5	113.2	214.1	171.1	236.3	198.0	164.8	71.3	147.8	115.6
<b>Q1 2023</b>	127.4	115.0	103.1	96.4	130.4	127.6	152.9	121.4	107.8	47.4	82.5	53.4



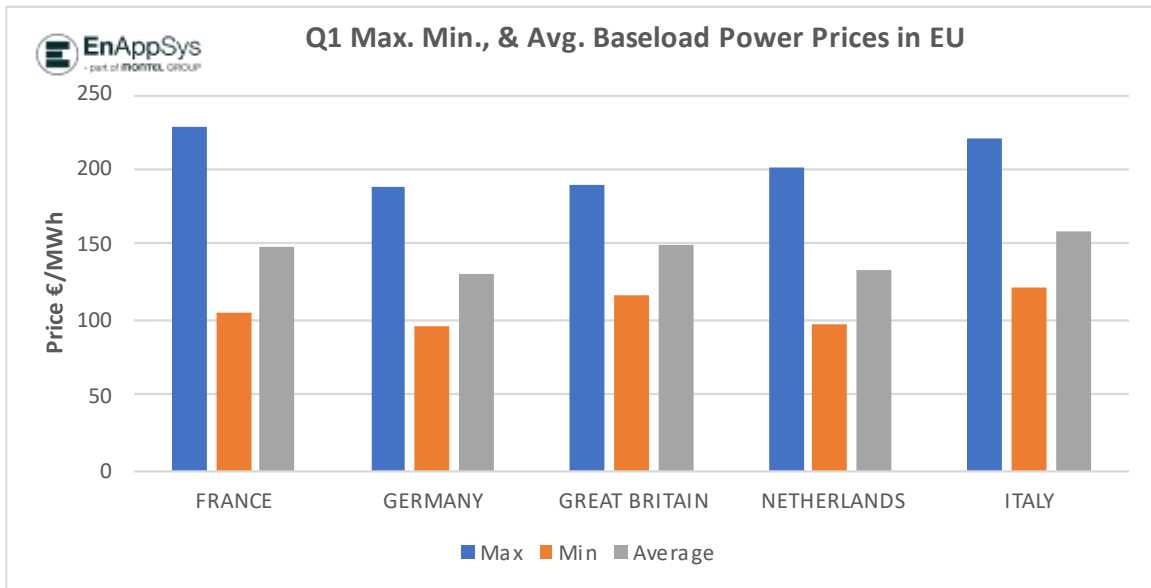


Figure 2: Baseload Power Price Across Europe Q1 2023

### 3 Generation Activity Overview

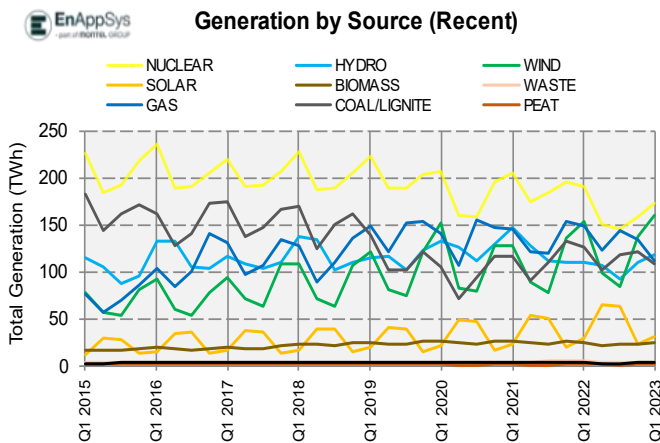


Figure 7: Generation by source in Europe from 2015 to Q1 2023

During Q1 2023, renewable generation levels increased by 5%, while nuclear generation fell by 10% and fossil fuel generation dropped by 20% compared to the corresponding period in 2022. Both hydro and wind generation levels surpassed those of Q1 2022. However, due to the reduced demand experienced this quarter, total generation amounted to around 734TWh, marking a 7% decrease from Q1 2022.

**Table 2: Quarterly generation summary Q1 2021 – Q1 2023 (TWh and %)**

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023
<b>TOTAL GENERATION BY FUEL (TWh)</b>									
Biomass	25.9	24.5	22.0	25.5	23.9	21.3	22.9	23.5	24.2
Coal/Lignite	116.5	89.8	110.5	132.6	126.2	101.5	118.5	121.7	108.6
Gas	145.4	121.4	120.0	153.0	148.8	122.6	142.8	133.6	112.1
Hydro	146.8	127.8	110.9	110.5	109.3	107.3	91.4	110.2	118.4
Nuclear	205.5	174.8	184.0	194.5	190.7	149.5	146.0	158.8	172.4
Oil	3.6	3.4	3.3	3.6	3.2	1.9	2.2	2.7	3.1
Peat	1.4	0.8	0.6	1.4	1.5	1.1	0.5	0.9	1.1
Solar	23.0	52.7	50.3	19.9	29.5	63.9	63.3	23.3	30.9
Waste	4.1	4.1	4.2	4.2	4.2	3.8	3.8	3.8	3.7
Wind	128.3	88.7	77.5	135.4	153.6	97.9	84.0	137.2	159.5
<b>FOSSIL FUELS</b>	<b>266.9</b>	<b>215.4</b>	<b>234.4</b>	<b>290.6</b>	<b>279.8</b>	<b>227.1</b>	<b>264.0</b>	<b>259.0</b>	<b>224.8</b>
<b>NUCLEAR</b>	<b>205.5</b>	<b>174.8</b>	<b>184.0</b>	<b>194.5</b>	<b>190.7</b>	<b>149.5</b>	<b>146.0</b>	<b>158.8</b>	<b>172.4</b>
<b>RENEWABLE (INCLUDES WASTE)</b>	<b>328.1</b>	<b>297.7</b>	<b>264.9</b>	<b>295.5</b>	<b>320.5</b>	<b>294.2</b>	<b>265.3</b>	<b>298.0</b>	<b>336.7</b>
<b>TOTAL</b>	<b>800.6</b>	<b>687.9</b>	<b>683.3</b>	<b>780.6</b>	<b>790.9</b>	<b>670.8</b>	<b>675.4</b>	<b>715.8</b>	<b>733.9</b>
<b>Fossil Fuel Percentage</b>									
Fossil Fuel Percentage	33%	31%	34%	37%	35%	34%	39%	36%	31%
<b>Clean Percentage</b>									
Clean Percentage	67%	69%	66%	63%	65%	66%	61%	64%	69%
<b>Renewable Share of Clean Power</b>									
Renewable Share of Clean Power	61%	63%	59%	60%	63%	66%	65%	65%	66%
<b>SHARE OF GENERATION (%)</b>									
Biomass	3.2%	3.6%	3.2%	3.3%	3.0%	3.2%	3.4%	3.3%	3.3%
Coal/Lignite	14.5%	13.1%	16.2%	17.0%	16.0%	15.1%	17.6%	17.0%	14.8%
Gas	18.2%	17.7%	17.6%	19.6%	18.8%	18.3%	21.1%	18.7%	15.3%
Hydro	18.3%	18.6%	16.2%	14.2%	13.8%	16.0%	13.5%	15.4%	16.1%
Nuclear	25.7%	25.4%	26.9%	24.9%	24.1%	22.3%	21.6%	22.2%	23.5%
Oil	0.5%	0.5%	0.5%	0.5%	0.4%	0.3%	0.3%	0.4%	0.4%
Peat	0.2%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Solar	2.9%	7.7%	7.4%	2.5%	3.7%	9.5%	9.4%	3.3%	4.2%
Waste	0.5%	0.6%	0.6%	0.5%	0.5%	0.6%	0.6%	0.5%	0.5%
Wind	16.0%	12.9%	11.3%	17.3%	19.4%	14.6%	12.4%	19.2%	21.7%
<b>FOSSIL FUELS</b>	<b>33.2%</b>	<b>31.2%</b>	<b>34.2%</b>	<b>37.0%</b>	<b>35.2%</b>	<b>33.7%</b>	<b>39.0%</b>	<b>36.0%</b>	<b>30.5%</b>
<b>NUCLEAR</b>	<b>25.7%</b>	<b>25.4%</b>	<b>26.9%</b>	<b>24.9%</b>	<b>24.1%</b>	<b>22.3%</b>	<b>21.6%</b>	<b>22.2%</b>	<b>23.5%</b>
<b>RENEWABLE (INCLUDES WASTE)</b>	<b>41.0%</b>	<b>43.3%</b>	<b>38.8%</b>	<b>37.9%</b>	<b>40.5%</b>	<b>43.9%</b>	<b>39.3%</b>	<b>41.6%</b>	<b>45.9%</b>

**Table 3: Year-on-year comparison of Q1 generation (TWh and %)**

	Q1 2018	Q1 2019	Q1 2020	Q1 2021	Q1 2022	Q1 2023
<b>TOTAL GENERATION BY FUEL (TWh)</b>						
Biomass	23.4	24.3	25.2	25.9	23.9	24.2
Coal/Lignite	169.3	138.9	105.4	116.5	126.2	108.6
Gas	128.1	149.2	140.7	145.4	148.8	112.1
Hydro	137.6	114.0	131.6	146.8	109.3	118.4
Nuclear	226.8	222.7	207.2	205.5	190.7	172.4
Oil	3.4	3.4	3.3	3.6	3.2	3.1
Peat	2.0	1.9	1.5	1.4	1.5	1.1
Solar	15.6	19.3	21.6	23.0	29.5	30.9
Waste	3.7	3.9	3.8	4.1	4.2	3.7
Wind	108.2	120.5	151.1	128.3	153.6	159.5
<b>FOSSIL FUELS</b>	<b>302.8</b>	<b>293.4</b>	<b>251.0</b>	<b>266.9</b>	<b>279.8</b>	<b>224.8</b>
<b>NUCLEAR</b>	<b>226.8</b>	<b>222.7</b>	<b>207.2</b>	<b>205.5</b>	<b>190.7</b>	<b>172.4</b>
<b>RENEWABLE (INCLUDES WASTE)</b>	<b>288.6</b>	<b>282.0</b>	<b>333.3</b>	<b>328.1</b>	<b>320.5</b>	<b>336.7</b>
<b>TOTAL</b>	<b>818.3</b>	<b>798.1</b>	<b>791.4</b>	<b>800.6</b>	<b>790.9</b>	<b>733.9</b>
Fossil Fuel Percentage	37%	37%	32%	33%	35%	31%
Clean Percentage	63%	63%	68%	67%	65%	69%
Renewable Share of Clean Power	56%	56%	62%	61%	63%	66%
<b>CHANGE SINCE Q1 2017 (%)</b>						
Biomass		4%	7%	11%	2%	3%
Coal/Lignite		-18%	-38%	-31%	-25%	-36%
Gas		16%	10%	13%	16%	-13%
Hydro		-17%	-4%	7%	-21%	-14%
Nuclear		-2%	-9%	-9%	-16%	-24%
Oil		2%	-3%	8%	-4%	-8%
Peat		-4%	-23%	-27%	-23%	-47%
Solar		24%	38%	47%	88%	98%
Waste		4%	3%	10%	14%	1%
Wind		11%	40%	18%	42%	47%
<b>FOSSIL FUELS</b>		<b>-3%</b>	<b>-17%</b>	<b>-12%</b>	<b>-8%</b>	<b>-26%</b>
<b>NUCLEAR</b>		<b>-2%</b>	<b>-9%</b>	<b>-9%</b>	<b>-16%</b>	<b>-24%</b>
<b>RENEWABLE (INCLUDES WASTE)</b>		<b>-2%</b>	<b>15%</b>	<b>14%</b>	<b>11%</b>	<b>17%</b>

## 4 Notes on the Report

The figures used in the report refer to data provided through ENTSO-E for the period from 2015 which have been aggregated by EnAppSys into a European total. This data does sometimes suffer from outages or gaps in reporting, but it is considered generally complete. This report is based on the most recently available data as at quarter and year ends. National Grid data is used for GB demand.

### Included Countries

Albania	Germany	Norway
Austria	Great Britain	Poland
Belgium	Greece	Portugal
Bosnia & Herzegovina	Hungary	Romania
Bulgaria	I-SEM	Serbia
Croatia	Italy	Slovakia
Czech Republic	Latvia	Slovenia
Denmark	Lithuania	Spain
Estonia	Montenegro	Sweden
Finland	Netherlands	Switzerland
France	North Macedonia	

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**EnAppSys Ltd.**

Blenheim House, 1 Falcon Court, Stockton On-Tees, TS18 3TS, U.K.  
Company Registration No.: 04685938

**EnAppSys B.V.**

Oostelijk Bolwerk 9, 1<sup>st</sup> Floor, 4531 GP, Terneuzen, The Netherlands  
Company Registration No.: 67992358

